

Cisco Nexus Dashboard Insights Explore, Release 6.3.1 - For Cisco ACI

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New and Changed Information

The following table provides an overview of the significant changes up to the current release. The table does not provide an exhaustive list of all changes or the new features up to this release.

Table 1. New Features and Changed Behavior in the Cisco Nexus Dashboard Insights

Feature	Description	Release	Where Documented
Reorganized Content	Content within this document was originally provided in the Cisco Nexus Dashboard Insights User Guide. Starting with release 6.3.1, this	6.3.1	Entire document
	content is now provided solely in this document and is no longer provided in the Cisco Nexus Dashboard Insights User Guide.		

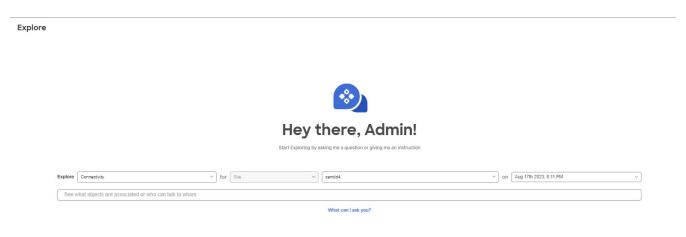
This document is available from your Cisco Nexus Dashboard Insights GUI as well as online at www.cisco.com. For the latest version of this document, visit Cisco Nexus Dashboard Insights Documentation.

Explore

About Explore

Explore analyzes a policy snapshot from the Cisco APIC to enable data center operators and architects to:

- Explore the ACI object models and associations
- Verify connectivity and segmentation between network assets



Explore allows network operators to discover assets and their object associations in an easy-to-consume natural language query format. Operators can quickly get visibility into their infrastructure and connectivity or segmentation between assets.

It allows you to select one of the three amongst **Connectivity**, and **Flow (Beta)** on *any selected site* on a *timeline* which could be a snapshot of the mode, **Latest**, **Last**, **Date range**, or **Time Window**.

It also allows operators to easily discover associations between traditional networking constructs such as VRFs, EPs, and VLANs to the ACI object model.

Explore is based on a natural language query interface. The types of queries supported by the feature include:

• What Query: Answers how the different networking entities are related to each other.

Examples for ACI:

- What EPGS are associated with VRF: /uni/tn-secure/ctx-secure
- \circ What EPs are associated with INF: topology/pod-1/paths-101/pathep-[eth1/3] or VRF:uni/tn-secure/ctx-ctx1

- What EPGs are associated with BD: uni/tn-secure/BD-BD1 and LEAF: :topology/pod-1/node-103
- Can Query: Answers whether the entities in the ACI policy can communicate with each other. Can queries can also be used to determine if the entities in the ACI policy can communicate using protocols such as TCP, UDP, or ICMP and the source and destination ports used for communication.

Example:

- Can entity *A* talk to entity *B*.
- Can EPG: uni/tn-secure/ap-AP0/epg-B talk to EPG: uni/tn-secure/ap-AP0/epg-A on tcp dport: 80 sport: 10



You can also click **What Can I ask you?** to view the entire list of the pre defined queries. When you click any one of the queries and click **Enter**, it brings up the corresponding details page for that search.



The **What** and **Can** queries are supported only for connectivity.

• How Query: Provides details on the communication between the entities in the ACI policy.

Example: How does EPG *X* talk to EPG *Y*.

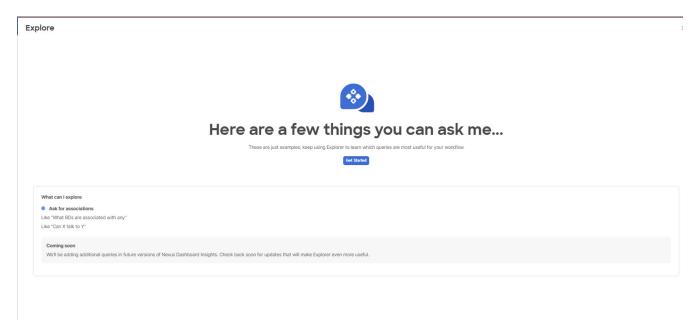
• View Flows from IP: Query - You start a query with View Flows from IP: followed by the IP address. This brings up the details page for that search.



The View Flows from IP: Query is available only for Flow (Beta)

What Can I Ask You?

Click **What can I ask you?** , to display the page where all possible explore queries are listed. Use this page to determine the list of queries you can explore. Click the **Get Started** button to go back to Explore.



• Ask for Associations - An example of such a query would be Can X talk to Y.

Use Cases

- **Design verification**: Ad-hoc query model enables operators to quickly understand and reason about their infrastructure. The natural language query model returns search results and associations in an easy to understand tabular format. In a single concise view, operators are able to answer design verification questions or discover deviations from organizational best practices.
- **Lightweight book-keeping**: Administration and maintenance teams can provide on demand visibility into the current state of their policy and networking infrastructure allowing inventory, book-keeping, and asset tracking procedures to be lightweight.
- Connectivity and Segmentation: Easily answer connectivity questions between a pair of assets or containers of assets. For example, if a group of EPGs needs to be quarantined, the Can query can quickly answer if policy has been correctly setup.

CAN Query Results

Explore provides a consolidated view of all the security, forwarding, and endpoint issues based on the query.

It enables you to explore the connectivity between entities by creating a query. The Can query determines if the entities can communicate with each other and the health of the connectivity. The **How do they talk?** area displays the configuration used for communication between the entities and the health of the connectivity.

In **Explore**, you default to the first site in the selected sites that is found in the header. Choose the latest snapshot for the site, and generate a model. Assuming the model has enough data, you can then start a query by typing into the input box.

Can Query Results

The results of the Can query are displayed in the **Radial View**. The **Radial View** displays the association view and the connectivity view for a Can query. The default radial view displays the connectivity and the health of the EPGs.

In the **association view**, you can use the inner and outer radial bands to explore the associations between the different objects.

In the **connectivity view**, you can use the single radial band to view the prefixes or EPGs as entities.

The View Controls enables you to filter the information displayed in the radial view.

The **EPG view** displays connectivity information between different EPGs as configured in the APIC policy.

The prefix view displays connectivity information between prefixes as configured in the APIC

policy or learnt prefixes.

The **object view** displays the associations between the different objects such as tenants and VRFs.

The **health view** displays the health of the connectivity. The connectivity can be healthy or unhealthy.

The different components of the radial view represent different types of information under **View Controls**:

- If you select EPGs, Tenants, and Both, the outer ring represents the tenants, the inner ring represents the application profiles, and arced lines in the middle show the health of the contracts.
- If you select EPGs, VRFs, and Both, the outer ring represents the VRFs, the inner ring represents the bridge domains, and arced lines in the middle show the health of the contracts.
- If you select Prefixes and VRFs, and Both, the outer ring represents the VRFs, the inner ring represents the bridge domains or L3Outs, and arced lines in the middle show the health of the contracts.

In **How do they talk?** area in the GUI, the results display in the **Connectivity Table**, **Prefix Table**, and **Anomalies** table.

Table you can determine the health of the connectivity. If the connectivity is healthy, using the **Connectivity** Table you can determine the health of the connectivity. If the connectivity is unhealthy, you can use the **Policy**, **Forwarding**, and **Endpoint** tabs to determine the possible cause. The possible causes for unhealthy connectivity include security violations, forwarding violations, and endpoint violations.

The color of the flow between the EPG pair indicates the maximum severity of anomalies across **Policy**, **Forwarding**, and **Endpoints**.

- Red Color indicates critical anomalies
- Orange color indicates major anomalies
- Yellow color indicates warning anomalies
- Green color indicates healthy anomalies

For example if the issues are related to security violations, you can use the **Connectivity Table**, **Prefix Table**, and **Anomalies** table to determine the anomalies associated with the security issue.

In the **Prefix Table**, you can click **Subnet/Route** to see information regarding the prefixes.

In the **Anomalies** table you can click the anomaly to determine the objects in your fabric that are affected by the issue. Pass or Fail checks are performed on the anomaly and the suggested steps to resolve the issue are displayed. See Creating a Can Query.

Guidelines and Limitations

- You can explore for endpoints using the MAC or IP addresses as well.
- If your searched query falls into a broad category, Explore will show a list of all the items

matching that criteria.

- Explore is case sensitive.
- In **Explore**, four active snapshots to explore across all sites is supported. The snapshots can be used for exploration by either the same user or by multiple users. To explore additional snapshots, you must offload an existing snapshot before exploring. In **Offload Snapshot From Explore** you can select the snapshots to offload. This dialog box displays automatically when you load 4 snapshots in memory.
- The Explore feature is supported only for IPv4 prefixes.
- All queries created using the Explore feature are unidirectional.
- In **Explore**, if the analysis fails, the error message *Analysis has failed* is displayed. Download the tech support logs for **Explore** and contact Cisco TAC to resolve the issue.
 - a. In Cisco Nexus Dashboard, choose Operations > Tech Support, choose Actions > Collect
 Tech Support > and choose the appropriate service for Cisco Nexus Dashboard Insights to
 download the tech support logs.
 - b. Navigate to /data/services/app_logs/cisco-nir-logger/nae/nae/explorerService/ directory to locate the logs for the Explore feature. If there are multiple Explore instances running, the logs for each instance will be located in a separate directory.

```
nae-policyexplorer-0/explorer.log
nae-policyexplorer-1/explorer.log
nae-policyexplorer-2/explorer.log
nae-policyexplorer-3/explorer.log
```

- Prefixes configured under L3extSubnet without their learnt route will not be listed as part of the auto-suggestions when you enter a query in the Search bar.
- To explore the APIC resources successfully using the Explore feature, the APIC policy must contain either valid endpoints such as fv:CEp or valid EPGs.
- In **Compliance**, the policy intent based on contracts is used to determine the compliance.
- **Explore** has the following scale limits:
 - On virtual Nexus Dashboard we support snapshots with 100,000 logical rules and 350,000 (Vertices + Edges).
 - On physical Nexus Dashboard we support snapshots with 300,000 logical rules and 1000,000 (Vertices + Edges).

Creating a What Query

This query helps answer the question, "What entities are associated with each other?"

- 1. In the Navigation, click Explore.
- 2. In the **Timeline** select a snapshot for analysis. When you select a snapshot, the data to explore is loaded on demand.
- 3. Generate a model and when there is enough data, you will be able to type in a query in the

input field.

4. In the query selector field, enter a **What** query. The query must include two groups of one or more entities available in the **Search** bar. See <u>Supported Queries</u>.

RESULTS

By default, **What** endpoints are associated with the **Any** query view. The Query results are displayed on the page, and you can drill further to see the associated entities. You can also add to the source and destination list. (Can source talk to destination?)

In the **What entities can talk?** area, the radial is displayed with **View Controls** for additional filtering.

- 1. Click inside the radial to get more information as required.
- 2. Click an entity in the **Query Results** table to view details.
- 3. Click a number in the results table to view details about the entity in the ACI policy.

Creating a Can Query

The can query will provide information that answers the question, can two entities communicate with each other?

Procedure

- 1. In the Navigation, click **Explore**.
- 2. In the **Timeline**, select a snapshot for analysis. When you select a snapshot, the data to explore is loaded on demand.
- 3. Generate a model and when there is enough data, perform the following actions.
- 4. In the query selector field, enter a **Can** query. The query must include two groups of one or more entities from the ACI policy. For details, see <u>Supported Queries</u>.



An automatic check is performed to see if the source entity can talk to the destination entity. You can click **Reverse Query** to reverse the source and destination entities for a query.

5. Use **View Controls** to choose different entities for more information.

RESULTS

A radial is rendered. You can drill down in the radial and get more detailed information as required.

Below the radial, the **How do they talk?** area displays how the two entities communicate with each other.

Related Policy, Forwarding, and Endpoint information is displayed in a table with associated anomalies

The color of the flow indicates the maximum severity of anomalies across the **Policy**, **Forwarding**, and **Endpoints** tab.

- Red color indicates critical anomalies
- Orange color indicates major anomalies
- Yellow color indicates warning anomalies
- · Green color indicates healthy

Policy enables you to explore the security policy issues based on the query.

Forwarding enables you explore a prefix or pair of prefixes issues based on the query.

Endpoints allows you to explore the endpoint issues based on the query.

If the query results are large, the message "The query returned too much data to display" is displayed.

Use the **View Controls** > **Advanced** > **From EPG** and **To EPG** Search bar to create a more specific query for the results to be displayed.

Can queries containing large associations such as vzAny may timeout. Use the **View Controls** > **Advanced** > **From EPG** and **To EPG** Search bar to create a more specific query.

For a query between prefixes, if the number of EPGs shared by the prefixes is greater than 25, the Endpoint table fails to load the data and displays an error message. Create an EPG to EPG query to display the results in the Endpoint table.

See CAN Query Results for more details about the **Can** query and the **How do they talk?** area. See [VIEW Query Results] for information about query results.

Supported Queries

The following table lists the queries supported by the **Explore** feature for ACI.

Supported What Queries

Table 2. Supported What Queries

Query	Entity	Operator	Entity
What BDs are	• ?	• And	• Any
associated with	• Any	• Or	• BD
	• BD		• ENCAP
	• ENCAP		• EP
	• EP		• EPG
	• EPG		• INF
	• INF		• LEAF
	• LEAF		• VRF
	• VRF		
What ENCAPs are associated with	• ?	• And	• Any
	• Any	• Or	• BD
	• BD		• ENCAP
	• ENCAP		• EP
	• EP		• EPG
	• EPG		• INF
	• INF		• LEAF
	• LEAF		• VRF
	• VRF		
What EPGs are	• ?	• And	• Any
associated with	• Any	• Or	• BD
	• BD		• ENCAP
	• ENCAP		• EP
	• EP		• EPG
	• EPG		• INF
	• INF		• LEAF
	• LEAF		• VRF
	• VRF		

Query	Entity	Operator	Entity
What EPs are	• ?	• And	• Any
associated with	• Any	• Or	• BD
	• BD		• ENCAP
	• ENCAP		• EP
	• EP		• EPG
	• EPG		• INF
	• INF		• LEAF
	• LEAF		• VRF
	• VRF		
What INFs are associated with	• ?	• And	• Any
	• Any	• Or	• BD
	• BD		• ENCAP
	• ENCAP		• EP
	• EP		• EPG
	• EPG		• INF
	• INF		• LEAF
	• LEAF		• VRF
	• VRF		
What Inventory is	• ?	• And	• Any
associated with	• Any	• Or	• BD
	• BD		• ENCAP
	• ENCAP		• EP
	• EP		• EPG
	• EPG		• INF
	• INF		• LEAF
	• LEAF		• VRF
	• VRF		

Query	Entity	Operator	Entity
What Leafs are	• ?	• And	• Any
associated with	• Any	• Or	• BD
	• BD		• ENCAP
	• ENCAP		• EP
	• EP		• EPG
	• EPG		• INF
	• INF		• LEAF
	• LEAF		• VRF
	• VRF		
What VRFs are	• ?	• And	• Any
associated with	• Any	• Or	• BD
	• BD		• ENCAP
	• ENCAP		• EP
	• EP		• EPG
	• EPG		• INF
	• INF		• LEAF
	• LEAF		• VRF
	• VRF		

Supported Can Queries

Table 3. Supported Can Queries

Query	Entity	Operator	Protocol	Destination Port	Source Port
Can BD bd_name talk to	 BD ENCAP EP EPG INF LEAF VRF Subnet ANY* 	On	• TCP • UDP • ICMP	 Port Number Port Range Well- known Port 	 Port Number Port Range Well- known Port

Query	Entity	Operator	Protocol	Destination Port	Source Port
Can ENCAP encap_name talk to	• BD • ENCAP • EP • EPG • INF • LEAF • VRF • Subnet • Any	On	• TCP • UDP • ICMP	 Port Number Port Range Well- known Port 	 Port Number Port Range Well- known Port
Can EP ep_name talk to	• BD • ENCAP • EP • EPG • INF • LEAF • VRF • Subnet • Any	On	• TCP • UDP • ICMP	 Port Number Port Range Well- known Port 	 Port Number Port Range Well- known Port
Can EPG epg_name talk to	 BD ENCAP EP EPG INF LEAF VRF Subnet Any 	On	• TCP • UDP • ICMP	 Port Number Port Range Well- known Port 	 Port Number Port Range Well- known Port

Query	Entity	Operator	Protocol	Destination Port	Source Port
Can INF inf_name talk to	 BD ENCAP EP EPG INF LEAF VRF Subnet Any 	On	• TCP • UDP • ICMP	 Port Number Port Range Well- known Port 	 Port Number Port Range Well- known Port
Can LEAF leaf_name talk to	 BD ENCAP EP EPG INF LEAF VRF Subnet Any 	On	• TCP • UDP • ICMP	 Port Number Port Range Well- known Port 	 Port Number Port Range Well- known Port
Can VRF vrf_name talk to	 BD ENCAP EP EPG INF LEAF VRF Subnet Any 	On	• TCP • UDP • ICMP	 Port Number Port Range Well- known Port 	 Port Number Port Range Well- known Port

Query	Entity	Operator	Protocol	Destination Port	Source Port
Can Subnet subnet_name talk to	 BD ENCAP EP EPG INF LEAF VRF Subnet Any 	On	• TCP • UDP • ICMP	 Port Number Port Range Well- known Port 	 Port Number Port Range Well- known Port
Can ANY talk to	 BD ENCAP EP EPG INF LEAF VRF ANY 				



The **Operator**, **Protocol**, **Destination Port**, and **Source Port** are not supported in CAN queries for these ANY entities.

Explore for Nexus Dashboard Orchestrator

Review About Nexus Dashboard Orchestrator Integration prior to reading this section.

The **Explore** feature in Nexus Dashboard Insights allows network operators to discover assets and their object associations in an easy-to-consume natural language query format. Nexus Dashboard Orchestrator assurance for Explore workflows currently supports a **Can EPG talk to EPG** query where the query must include two distinct Nexus Dashboard Orchestrator policy entities to view their connectivity.

After you run assurance analyses against the sites in your Nexus Dashboard Orchestrator deployment, you will be able to navigate associations between EPGs, explore EPG to EPG communication, and enable visibility and troubleshooting across sites.

Explore provides you with EPG details from your programmed Nexus Dashboard Orchestrator templates or schemas. You can view which EPG entities can communicate. The entities stretch across the sites. If there are anomalies raised in these connections, those anomalies are also displayed here.

Nexus Dashboard Orchestrator supports pushing configurations to one site or to multiple sites.

Examples:

- Can EPG_1_ talk to EPG_2_.
- Can any talk to any



Currently, only **Can** EPG to EPG queries are supported for Nexus Dashboard Orchestrator assurance. **What** queries are not supported. For **Can** EPG to EPG queries, additional filtering based on protocols and port is not supported.

Examples:

- This is an example of a query that is supported: Can EPG: uni/tn-secure/ap-AP0/epg-B talk to EPG: uni/tn-secure/ap-AP0/epg-A
- This is an example of a query that is **not** supported: Can EPG: uni/tn-secure/ap-AP0/epg-B talk to EPG: uni/tn-secure/ap-AP0/epg-A on tcp dport: 80

You can choose from the auto-suggested query-list of all EPGs within the Nexus Dashboard Orchestrator assurance Sites. **Can** query results are available as an aggregated view across all sites within the Nexus Dashboard Orchestrator assurance sites and not per ACI site. All queries are across-site queries, and the maximum severity of assets and associations across all sites is shown in the results.

Notes Related to Explore for Nexus Dashboard Orchestrator

After running your query, when you view the Connectivity Table and the Policy Table, in the Source EPG and Destination EPG columns a shadow tag to an EPG will be displayed if the EPG is a shadow in the corresponding site. For example, <epgname>(shadow). If an EPG is not a shadow, there will be no shadow tag after the EPG name. However, if you have a version of

APIC/Nexus Dashboard Orchestrator that does not have the shadow annotation, the shadow tag will not display even for shadow EPGs.

- In the **Endpoints**, **Forwarding**, and the **Policy** tables, you can click a site for specific anomaly details.
- The **Anomalies** table displays individual, aggregated, or inter-site anomalies based on the queries that you have selected.

Use Cases For Nexus Dashboard Orchestrator Assurance of the Explore Workflow

- **Design verification**: The impromptu query model enables operators to quickly understand and reason about their infrastructure. The natural language query model returns search results and associations in an easy-to-understand tabular format. In a single concise view, operators can answer design verification questions or discover deviations from organizational best practices.
- **Lightweight book-keeping**: Administration and maintenance teams can provide on demand visibility into the current state of their policy and networking infrastructure allowing inventory, book-keeping, and asset tracking procedures to be lightweight.
- **Connectivity and Segmentation**: Easily answer connectivity questions between a pair of assets or containers of assets. For example, if a group of EPGs must be quarantined, the **Can** query can quickly reveal if the policy is correctly setup.

Creating a Can Query in Nexus Dashboard Orchestrator Inter-Site

Before You Begin

Complete running assurance analyses against the sites in your Nexus Dashboard Orchestrator deployment.

- 1. In the Navigation, choose **Explore**.
- 2. In the Explore pane, select **Orchestrator**. Choose one of the integrations available from the drop down.

By default, the dropdown menus in the **Explore** field will display **Policy Connectivity for Inter-Site Assurance**.

3. In the **Snapshot** field, choose the appropriate snapshot for your analysis. The data to explore is loaded on demand. This enables you to query the specific snapshot you've selected.



Nexus Dashboard Orchestrator assurance for Explore workflows currently supports a **Can EPG talk to EPG** query where the query must include two groups of one or more entities from the Nexus Dashboard Orchestrator policy to check their connectivity.

- 4. In the **Search** bar, enter a Can query. The query must include two groups of one or more supported entities. By default, the Any to Any query view is displayed.
- 5. In the **Can Source Talk to Destination** area, you can confirm whether source can talk to destination.
- 6. (Optional) Click **Reverse Query** to reverse the source and destination entities for a query.
- 7. In the **Which entities Can Talk?** area, under **View Control**, click **EPGs** to view the communication between the EPGs. The EPG view displays connectivity information between different EPGs.

In the radial view, the colors of the arced lines correspond to the severity of the anomalies.

- 8. Click the appropriate arrow inside the radial to view further details in the page.
- 9. In the **How do they talk?** area, view how the entities communicate with one another.

RESULTS

For a Can Query, the results are displayed in a radial in the **Which Entities Can Talk** area.

The results display if the queried EPGs can communicate with one another.

The color of the arrow represents the maximum severity for the connection.

If the query results are large, the message "The query returned too much data to display" is shown.

Select a single resource from the **Would you like to check connectivity of a single resource** drop-down list to create a specific query.

When you click a specific connection in the radial view, you view the details for the connection in the tables that follow.

You can see the policy that is programmed as part of the EPG.

You can verify the prefixes that are part of the connection.

You can also view which endpoints are affected because of this communication.

For Nexus Dashboard Orchestrator Inter-Site Assurance Explore, the Policy, Forwarding, and Endpoints tables, display an additional **Sites** column.

The connectivity information for each site, that is part of your query, is displayed here. For each of these sites, if there are any anomalies that are generated, you can view them here.

For example, as a part of endpoints if there is a **Major** anomaly, you can click to choose it and click **Analyze** to view the details for the anomaly.

The details are provided in the Nexus Dashboard Orchestrator context. You can learn what is being programmed by Nexus Dashboard Orchestrator across multiple sites and you can verify the query

and check the communication between different EPGs that are used. The inter-site view displays Nexus Dashboard Orchestrator associated Site anomalies.

Supported Queries for Nexus Dashboard Orchestrator

The following table lists the queries that Nexus Dashboard Orchestrator assurance supports for the **Explore** feature.

Supported Can Queries

Table 4. Supported Can Queries

Query	Entity	Operator	Protocol	Destination Port	Source Port
Can EPG epg_name talk to	EPG	_	_	_	_
Can ANY talk to	• EPG	_	_	_	_
	• ANY				



The **Operator Protocol**, **Destination Port** and **Source Port** are not supported.

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